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SUMMARY FINAL REPORT
CONTRACT N00014-87-D-6028
TASK 2C
FUNCTIONAL REQUIREMENTS AND IMPLEMENTATION PLAN

In the preparation of the Functional Requirement (FR) document, an approach was taken to make the most use of existing sonar model operating system technology. The document completed the top level design considerations, overall architectural concepts and a formal definition of the comprehensive MOS acoustic modeling functions with their inputs and outputs. During the preparation of the FR, alternatives for the executive system user interface were evaluated. A recommendation was made to use the C-WORTHY user interface management system that is commercially available from Solution Systems, Inc. Some of the other software integrated into FR Initial Operating Capability configuration addressed noise, beam pattern, and output data preparation graphic display applications.

A preliminary data flow and functional definition for the Initial Operating Capability configuration was prepared and translated into a Work Breakdown Structure (WBS) for the MOS Implementation Plan. During meetings, several IOC design issues were raised and alternative approaches were discussed. Specifically, the most significant of these issues dealt with the environmental data base architecture, the ocean environment and transmission loss work file interface, and the development appraoch to be used for the MOS Executive Man-Machine Interface (MMI). An analysis of existing software that would satisfy the data base implementation and ocean environment/transmission loss working file interface requirements was conducted. Formal written recommendations

were prepared and forwarded to NORDA with the appropriate documentation on 30 September 1988. The MMI development alternatives were evaluated and a memorandum was sent in October 1988 detailing the evaluation rationale and the recommended alternative.

The Functional Requirement Document and the Implementation Plan were delivered by SYNTEK in October 1988.

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TASK 3A

This task included automating the GOAP Analysis. The Analysis involves interactively analyzing the Harvard Model output to produce the TESS Model input, executing the TESS Model, and merging the TESS Model output with either the ICAPS or the GDEM data set. The GOAP Analysis creates a new climatological data base. The process is executed approximately every week. Originally the TESS Model was on the HP9020 and then was implemented on the VAX. We also studied the possibility of downloading the TESS Model from a VAX 11/785 to the Zenith 248 PC. A study was also made for storing the data bases on the PC. Documentation was developed for the TESS Model Automation on the VAX 8650.

Other tasks included the following:

- Verified the PC ASTRAL 2.0 Model output with the PC Split Step PE Model output for the Harvard data base environment. Four comparative runs were performed.

- Automated Split Step PE Model runs using the Scenario Generator output as input.

- Designed and implemented an on-line NORDADB Data Base Management Application. Developing the operational user guide for the data base system.

- Assisted in the standardization of NORDA Code 222 shared software. Involved in planning a maintenance criteria for the updates of the software programs and

developed a shared library of the standardization software.

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TASK 3B

A program was designed (with necessary supporting programs) to compute various acoustical parameters (for example: critical depth, depth excess, range to first convergence zone, etc.) from a data base of sound speed profiles and create the necessary files to run the output through the plotting program SHDPLT12 already implemented on the Zenith by Mark Fernandez.

This program interacts with the DBDB5 bathymetric data base, the IBLUG data base, and runs on the Zenith in ABSOFT. The program is currently being used as part of the Critical Sea Test 1 software by George Kerr and Bruce Gornes.

Revisions were made to a bathymetric blockage program written by Linda Knauer (PSI). The program graphically represents the degree to which sound waves may be blocked by the local bathymetry around the receiver. Revisions (made on the VAX in FORTRAN) consisted mainly of enabling the data base management to be independent of the INGRES package. The bathymetric blockage program (INGRES independent) was downloaded from the VAX11/785 to the Zenith 248 PC.

The acoustic parameter program mentioned above was implemented on the VAX and the Zenith PC. SYNTEK made some improvements in the overall program design including formatting the output from this program to enable plotting by SHDPLTV4 which is already implemented on the VAX.

A thermal analysis package designed to aid in determining environmental parameters based on shipboard observation (i.e., BT and CTD data) was developed. The first step involved making a gridded temperature field from randomly spaced BT/CTD data while filling in the holes with influences from a prechosen historical climatology. The results of this analysis can be checked using various graphics routines to compare raw data against processed gridded data. If the results are satisfactory, then the gridded field is merged with the chosen climatology (which can be a previous analysis) to yield a 3-dimensional sound speed field based on the measured BT/CTD data. Again, these results can be checked using graphics routines. If acceptable, these results can then be used as inputs to the various acoustic models.

The package is currently being implemented on a Zenith 248 computer. All data base management is being done through FORTRAN direct access files.

INGRES tables for LRAPP acoustic exercise data were created. The LRAPP data base contains many exercise results ranging from depth, temperature, and salinity profiles to acoustical data.

GDEM profiles were extracted for use in a program being developed by SYNTEK that finds all occurrences of double ducts in the sound speed profiles of the entire GDEM model. This involves analysis of slope change and vertical length of first duct for all four seasons. Profiles were extracted for the entire world for each season. These were then run through a routine to count slope changes and flag those with 2 or more. Next, the locations of these changes were plotted according to duct strength using the SHDPLT routine. Finally, a group of sample profiles from each flagged cluster

was extracted and plotted to see which groups were actually double ducts.

Finally, a program was developed to create Binary Rectangular Matrices on the Zenith 248 PC for use in Mark Fernandez's Microsoft Fortran version of the Jerry Landrum plotting program.